ROINN NA MARA

FISHERIES RESEARCH CENTRE

REPORT FOR 1992

FISHERY LEAFLET 153 *DUBLIN 1993*

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INTRODUCTION

DIRECTOR'S FOREWORD - David de G Griffith

This report of the Fishery Research Centre's 1992 programme reflects not only the wide range of the work carried out, but also the extensive multidisciplinary expertise available at the FRC which we deploy in support of resource-based industries and other marine-oriented commercial enterprises.

The report also provides information on the important scientific activities which the FRC has been able to initiate or expand by means of the valuable funding received under the EC STRIDE initiative. The £2.02 m allocated to the FRC over the period 1991-1993 (75% funded by the EC) is being used to carry out applied research in the three main areas of our responsibility - fish stocks, aquaculture and marine environment - in support of Irelands marine based industries. Under STRIDE we have augmented the FRC staff by 23 people (a 50% increase) in order to implement this extended research programme. This intake of contract staff comprises 2 post-doctorates, 10 post-graduates, 8 laboratory technicians and 3 technical (clerical) assistants.

The STRIDE projects are identified in the Report's section headings.

THE STRIDE PROGRAMME - John Browne and Jacqueline Doyle

The STRIDE programme of the European Community provided a sum of £8.3 million for marine research and development, representing the most significant cash injection received by Irish marine science for some time. Of this, £2.02 million was allocated to FRC and £730,000 to the purchase of equipment for the research vessel *Lough Beltra*. The funds, payable in the two years 1992 and 1993, have been divided between fish stock research, aquaculture, environment and a number of projects to improve the general operation of the Centre.

The principal projects in the area of fish stock assessment will concentrate on research into "new" species, hitherto unexploited by the Irish fleet, chiefly deep water species over the continental slope to the west of Ireland. Other applications include studies on the physiology of migrating salmon smolts, sea ranching of salmon and fishing gear technology.

Much of the input to environmental monitoring and aquaculture will be the provision of state-of-the-art equipment for chemical analysis, benthic ecology and oceanography. The distribution and abundance of toxic algal cysts in coastal waters will be mapped.

Projects to benefit all aspects of the laboratory's work comprise upgrading of the FRC computer system, acquiring our own expertise in hydro-acoustics, the development of a geographic information system (GIS) and satellite imagery capability and the upgrading of in-house conference facilities.

THE STOCK ASSESSMENT GROUP - John Browne

The range of assessment skills of the group was extended and supplemented by the provision of expertise and new research programmes under the STRIDE programme. Five fleet assessment technicians completed their training to extend existing sampling out onto the fishing boats and greatly augment our existing data bases. Two further programmes , an economic evaluation of fishing in the Irish Sea and a research programme on the deep water argentine *Argentina silus* funded under the EC FAR programme were set up and will greatly strengthen the management and advisory capability of the assessment group.

The demersal stocks in areas VI and VII however were monitored and the sampling data base was considerable expanded and research work on salmonids was extended to include an assessment of stocks on the River Moy. A great deal of time and resource was given to support the various seatrout programmes being carried out.

Work on elasmobranchs, hake, monkfish and megrims was suspended, work on nephrops was confined to the Irish Sea and the pelagic section confined its monitoring to mackerel and herring.

AQUACULTURE AND ENVIRONMENT - Jacqueline Doyle

Aquacultural production has continued to expound and a substantial part of the work of the section entails the preparation and evaluation of environmental impact statements for view or expanding installations. Appraisal of possibilities for novel species included a study of the suitability of a former smolt-rearing unit as a turbot hatchery. Although this particular project was not found feasible studies on turbot have continued.

Fish farm inspections to study the impact of treatment methods on sea lice populations continued great difficulties being encountered in locating sea lice at and distance from the salmon cages.

The scope and range of the marine environments programme have been expanded by the purchase of new equipment with the support of STRIDE funds. This has included a mass spectrophotometer which will facilitate the identification of contaminants. With the exception of a very small number of isolated locations, the quality of coastal waters has been shown to be excellent.

DEMERSAL FISHERY

NEPHROPS (DUBLIN BAY PRAWNS) - Paul Hillis , Jim Carroll

Numbers sampled from commercial catches in the Irish Sea fishery included almost 18,000 in unsorted catch samples, 7,000 small whole discards and 16,000 landed Nephrops; in samples of unsorted and of discarded samples demersal bycatch species (mainly whiting) were supplied to the Demersal Section.
Preliminary returns indicate a reduction in commercial landings from around 3,400 tonnes in 1991 to under 1,100 tonnes in 1992. The fishery was affected by falling prices of the smaller Nephrops due to stockpiling which led to a switch from the Irish Sea to other areas, notably the Smalls grounds in the Celtic Sea where mean Nephrops size is larger, and a switch from Nephrops to demersal fish by visiting Co. Donegal boats based on Howth. A weakening of the market for small Nephrops was also indicated by a substantial increase in the volume of small Nephrops discarded from the catches. Investigations tend to support the view of the local fishermen to the effect that the western Irish Sea Nephrops fishery is now in marked decline due to over fishing.

A cruise with the research vessel, *Lough Beltra* carried out during June and July surveyed the Nephrops population on the main Irish Sea grounds at the season when availability to capture of both sexes is at its maximum. It continued a time series started in 1987, and collected data for analysis to estimate growth and mortality rates, and the effect of sea-bed type on the Nephrops population. In addition, hauls were replicated to investigate inherent variability in sample catch rates.

ANGLER, HAKE AND MEGRIM - Edward Fahy and Pól Ó Glásáin

Species of angler (monk), of which there are two, hake and megrim, make up a group of prime fish whose landings by the Irish fleet have increased by a factor of twenty over the past fifteen years. All have their greatest value when fresh and sold in Spain or France.

Component species of this group have been sampled since 1985/1987. Because they are taken in an international fishery and there is disagreement over ageing them, short term prediction has been difficult and the fisheries have been regulated by precautionary TAC. However, growing fishing pressure has prompted increasing concern and attempts are currently being made to carry out age-based population assessments of all species in the group.

Megrim
The first assessment of megrim landed into Ireland by the Irish Fleet, based on age was carried out on material collected in 1990. It has been followed by a second assessment based on material and information collected during the following year with particular emphasis on data gathered on the joint venture (Spanish) fleet. Sampling effort has been concentrated in the south west, the source of most of the megrim landed to this country.

Hake
Hake is landed mainly from the same ICES divisions adjoining southwest Ireland as the majority of our megrim. Most hake is landed in the second quarter when it is fished in large pre-spawning aggregations. The species is exploited by trawl and longline but there has been a rapid increase in the fixed net fishery for this species which is estimated to have expanded from taking 8% of the Irish landings in 1989 to 34% in 1991.

Traditionally, the main problems of hake management have arisen from the juveniles occupying the same substratum as *Nephrops* as a result of which they were captured in the same small-meshed trawls. The consequences

of heavy exploitation of the large spawning fish are unknown. However, the CPUE of joint venture vessels has declined sharply since the mid 1980s by about 30-50%.

Data analysed by FRC suggest the possibility that hake is more heavily fished in divisions VIIb-c and VIIg-k than in other parts of sub-area VII.

Angler

Assessment of the fishery for angler *Lophius* is complicated by the fact that two species, black and white bellied angler, contribute to the catches. Both are taken in a mixed demersal trawl fishery but in the recent past a directed tangle net fishery has been targeted on them. Its extent and consequences are currently unknown.

CPUE indices from the joint venture fleet do not move in a consistent way for these species - which are not, incidentally, separately recorded in the landings; species composition it determined by sampling. White bellied angler is dominant in shallow water and it becomes more important moving in a northerly direction. Black bellied monk has been dominant in some of the joint venture landings although samples from this source have tended to be smaller and hence less reliable.

Integrating the CPUE data from the joint venture fleet with the sampled weights of each species, suggested that black bellied angler has steadily increased in abundance since the mid 1980s whereas the white bellied species has declined.

A yield per recruit curve for white bellied angler corroborates what other assessments have shown: the species is currently suffering from growth overfishing.

Enmeshing gears

In 1991 a review of enmeshing gears in use in European and Mediterranean waters was undertaken for STCF. An estimate of the length of fixed gill net used by Irish Vessels, based on the observations of several years and a survey of fishing gears in use in 1991, proposed that just under 100,000 km of one type of net was set once per annum. Further data collection from the Carraigholt gill net fishery in Co. Clare was carried out during the year, extending our time series to five years.

COD, WHITING, HADDOCK, PLAICE AND SOLE -
Paul Connolly, Ciaran Kelly, Dermot Kennedy, Helen McCormick, Pól O'Glásáin,

In 1992 some 17,000 fish were aged and 131,000 fish were measured (an increase of 32% on 1991). In the young fish survey programme five cruises were carried out. The Irish Sea Survey (June and September) indicated the 1991 and 1992 cod and whiting year classes to be average. The Irish Sea Juvenile Plaice Survey found a very large 1991 year class; the South Coast Survey had good catches of juvenile cod and whiting but at present, the time series is too short to monitor recruitment. The West Coast Survey indicated the 1991 haddock year class to be very good but the survey was cut short due to severe weather. Several deep water cruises in a study of the commercial potential of deep water demersal fish off the west coast were carried out (May, October, November). This work commenced in 1992 and is directed at understanding the biology of potentially commercial deep water demersal fish (eg grenadier, rabbitfish, orange roughy) in order to provide basic information needed for any management measures which may be required in the future.

The results of stock monitoring and survey programmes were presented at the meeting of the ICES Northern Shelf and Southern Shelf Working Groups for stocks in the Irish Sea (VIIa), the Celtic Sea (VIIg), Donegal (VIa) and Rockall (VIb) for stock assessment purposes. In general, whitefish stocks in these areas are not in a healthy state. Irish Sea stocks are seriously depleted with very low 1991 stock levels for cod (2,500 t), whiting (5,700 t), plaice (3,400 t) and sole (3,500 t). The strong 1990 cod year class will help restore the cod stocks but there are fears that these fish may be caught before they have a chance to spawn. The Celtic Sea stocks are at a similar low, but less alarming level, with the 1991 stock sizes for cod at 5,000t, whiting at 10,500 t, plaice at 1,900 t

and sole at 2,100 t. The Donegal stocks are also at very low levels with stocks of cod (17,000 t), haddock (18,700 t) and whiting (15,000 t) giving rise to serious concerns. However the strong 1991 haddock year class will help to boost this stock.

WHITEFISH (unassessed stocks)- Edward Fahy, Maria Doherty

This project was set up to examine stocks of cod, whiting, haddock, saithe, pollack, plaice and sole off the west and southwest coast of Ireland (ICES Divisions VIIb, c and VIIj.k). These stocks have not previously been assessed and very little is known of their population dynamics. At present, these species are subject to precautionary TAC's in the absence of analytical assessments.

Work on this project commenced in October 1992 and has so far been geared towards reviewing existing fisheries information in VIIb,c and VIIj,k. Current stock assessment methods have been studied, historical landing figures have been compiled and the ports have been visited in order to set up sampling places and procedures, and to get to know fishery officers. Sampling of whitefish has taken place in Rossaveal, Dingle and Castletownbere. Baseline work off the west and south - west coasts has been initiated and contact has been made with foreign laboratories regarding fleets operating in VIIb,c and VIIj,k.

PELAGIC FISHERY

HERRING - John Molloy, Liz Barnwall

Celtic Sea and ICES subdivision VIIJ
The stock in this area was assessed on the basis of a detailed sampling programme of the catches during the main season (October-February), combined with an acoustic survey. The latter, which was carried out on board the Northern Ireland research vessel *Lough Foyle* consisted of two cruises designed to obtain an estimate of the abundance of the autumn and winter spawning components. The results of the investigation indicate that the stock is at a satisfactory level and has fully recovered from the collapse evident during the 1977-1982 period.

Subdivisions VIAS and VIIB
The stock in this area is assessed by means of a detailed sampling programme of the catches throughout the years. Catches are examined for age, length, sex, maturity and vertebral counts. This information ,however, is not of itself sufficient to enable the stock to be accurately assessed, but the available information does suggest that the stock is in a satisfactory condition and is not subjected to heavy exploitation. A young fish survey conducted on board the R.V. *Lough Foyle* was used to obtain information about the abundance of young herring.

ICES subdivision VIAN
The stock in this area is assessed by means of acoustic surveys carried out by UK. fisheries laboratories and by detailed sampling of catches. The stock situation also appears to be in a reasonably stable and healthy state.

MACKEREL - John Molloy, Liz Barnwall, Dermot Kennedy

The western mackerel stock is assessed mainly on the basis of an international egg survey which takes place every third year. The Irish survey in 1992 covered the important spawning areas west and southwest of Ireland, and was carried out on board the R.V. *Lough Foyle*. The results of all the surveys confirmed the recovery that has taken place in this stock in recent years and the TAC agreed for 1993 was the highest ever . A young fish survey, again part of an internationally co-ordinated operation, was also used to provide information about the abundance of juvenile mackerel.

ARGENTINES - Michael Ronan

Argentina silus was the object of much fishing interest between 1988 and 1991 when several EC/BIM funded exploratory fishing surveys were conducted to determine the potential for exploitation of this non-quota species, primarily at depths between 300 and 700m off the west coast of Scotland. Total landings by Irish vessels during this period were between 13,000 and 14,000 tonnes and efforts were successful in developing automated processing facilities for filleting the fish. Marketing trials were also conducted by IBM and were very positive in recommending argentines for human consumption. The limited biological data collected during these fishing surveys indicated that the stocks of Argentines represented a largely untapped resource but that the fish grew very slowly and would be very sensitive to overfishing. Since 1990 there has been a severe decrease in the numbers landed by the Irish boats presumably due to a collapse in the stocks.

The purpose of the present EC/FRC funded programme is to acquire more details of the biology , life history, distribution, and stocks of argentines off the west coasts of Scotland and Ireland. Special emphasis is being placed on the younger age groups of argentine which are not assessed by other studies on this species. It is very important that the distribution and nature of all stages of the life cycle of this species are more accurately understood before the realistic fishing potential, and the details of such a fishery , can be determined.

SALMON, TROUT AND EEL

SALMONID FISHES -
N. O' Maoileidigh, B. Doolan, A. Cullen, T. McDermott, N. Bond.

National microtagging programme
This is an ongoing monitoring programme designed to evaluate the exploitation of salmon stocks by commercial and recreational fisheries. Over 400,000 hatchery reared salmon smolts and several thousand wild salmon smolts were tagged and released in 1991. Of these, 320,000 were released as a joint programme of rehabilitation of the River Shannon salmon stocks with the Electricity Supply Board, the Central Fisheries Board and Salmara Teo. These fish returned as grilse in 1992 and will appear as 2-Sea-Winter salmon in 1993. The initial appraisal of the data indicates good survival back to the rivers of origin after exploitation by commercial gear. This programme will continue in 1993 with approximately 340,000 tagged smolts to be released.

National salmon catch statistics
A computerised system of recording national salmon catches from the licensed salmon dealers' registers developed by the FRC, has been installed in most Regional Fisheries Board headquarters. This system should greatly facilitate the retrieval of information and provide the regional managers with an efficient method of recording and storing this information. Ultimately, a national database of salmon catches by region, district, method, time period and licence details will be established. Information from a number of regional managers for 1992 indicates a good season for commercial and recreational fishermen and was considerably better than the previous two years.

Salmonid telemetry
Radio tagging and acoustic tagging programmes have been carried out on salmon in a number of Irish rivers since 1990. A tracking programme in 1991/92 of returning hatchery salmon from the River Erne (harnessed for hydroelectric power generation) indicated that the majority of tracked fish did not enter the main system but remained close to the vicinity of the fish ladder at the dam or in the headrace. It is unlikely that these fish would have contributed to the spawning stock of the system. A number of other fish left the system completely following tagging.

A major radio and acoustic tagging programme has been established on the River Moy, one of Ireland's principal salmon fisheries, as part of a programme to evaluate the status of the stock for future management. Preliminary results indicate that these wild fish can remain in the lower river for long periods before ascending, despite the onset of flood conditions. Salmon were subsequently recorded in a number of areas of the upper system including the mouth of Lough Cullen. Surprisingly, none of the tracked fish were recorded in the River Deel, one of the principal spawning rivers. These results have important implications for the management of the stock in the Moy system.

Enhancement Stocks - Origin, Progress and Status (ESOPS)
This programme was initiated in 1992 to establish a database of hatcheries involved in salmon enhancement or ranching programmes, the origin of the stocks being used in these programmes, the numbers of each stock being held at each development stage and the subsequent fate of the released stocks. This information is considered to be a vital prerequisite to establishing the usefulness and impact of restocking on salmonid fisheries. Most hatcheries involved in restocking of salmonids have been issued with an information form with which to fill out details of the hatchery stock on a monthly basis.

Establishment of the legislative basis for salmon ranching in Irish rivers.
A pilot scheme has been initiated on two rivers which will provide information on the population size and structure of salmonids prior to ranching. The programme includes establishment of the most suitable brood stocks based on survival of progeny and the possible impact on the indigenous stock due to escapement to the upper system. Guidelines will be produced based on scientifically described methodologies.

Physiology of salmonid smoltification
This programme commenced in 1991 in co-operation with the Zoology Department, University College Dublin. It will provide vital information relating to the physiological condition of smolts prior to, during and immediately after migration to the marine. Species under investigation include wild salmon and sea trout and hatchery reared salmon, sea trout and rainbow trout.

FRESHWATER EEL - Christopher Moriarty

Previous studies have indicated a great potential for the development of the eel stocks throughout the state with a target value of an export market worth £15 million of processed eel per annum. Two major initiatives were undertaken during the year with assistance from the FRC. The Electricity Supply Board which owns fishing rights over the entire Shannon catchment began a detailed assessment of the stocks together with the

operation of a controlled fishery for yellow eels. Preliminary results indicated under-stocking of Lough Ree and waters farther upstream. EOLAS carried out a pre-feasibility study of the lakes of the Erne catchment from which it appeared that stocks have decreased since the 1970s.

FRC work is directed largely to a long-term study of the eels of Lough Derg with the aim of improving methods of eel stock assessment. Results to date show great variation in catch per unit effort between months but overall a stable situation. Three trips were made and 470 eels sampled at specified locations.

MANAGEMENT

FISHERIES ECONOMICS - Paul Hillis

An EC-assisted project "Overall Optimisation of Profit in Irish Sea Fisheries: A Management Economics, Socio-Economic and Biological Study" progressed with (1) examination of a time-series of catches and fishing power in the Irish Sea from 1970 onwards, (2) an overall multi-species multi-gear-type multi-national simulation model of the Irish Sea Fisheries, (3) a survey of costs, earnings and attitudes to management measures in the Irish catching sector, and (4) detailed studies of the progress of recovery of the main exploited stocks in response to improved fisheries management.

While scarcity of good pre-existing data in some areas has retarded progress, emerging findings show that following greatly increasing fishing effort in the 1970's, and fluctuating but high levels of effort in the 1980's, the fisheries for most species are clearly markedly overfished. The formerly lucrative fisheries for cod and whiting are now very seriously overfished, and calculations indicate that optimal management of these fisheries would result in eventual increases in aggregate (not per person) profit of at least 40% and possibly as high as 80 %, depending on the strategy adopted.

Optimal management to assess such increased levels of overall profit faces two problems: (1) the short-term reductions in catch to allow the fish to undergo the additional growth would be very difficult for the industry to accept, and (2) the low level of effort at which overall profits would be maximised implies less work, and would postulate a choice of unchanged strength with individual catch quotas.

This scenario could however create a number of jobs in catch recording and monitoring activities.

The project is being carried out in collaboration with ESRI, BIM and the Sea Fish Industrial Authority (UK).

EC COMMON FISHERIES POLICY REVIEW GROUP - Paul Hillis

The EC Common Fisheries Policy Group was convened to advise the Minister on desirable amendments to the CFP during the period when it is subject to review by the European Community. It was reconvened under the chairmanship of Mr. Eamonn Doherty and met six times during August- December. Its main purpose has been to oppose any lessening of fishing opportunities for the Irish fleet in an attempt to mitigate the problem that whilst Ireland has about 16% of EC waters subject to CFP, it only has about 4% of quota allocations . It has also worked to make surveillance more effective.

Views from FRC have been contributed on a number of aspects of the operation of the CFP in Ireland and how it might be improved. The main subject has been that of future trends in stocks from which catches will be required to ensure the commercial survival of the fisheries.

A number of deep-water species (e.g. blue ling, scabbard fish, rabbit fish) are reputed to be giving a profitable return to certain non-Irish fisheries in offshore waters to the west of Ireland, but information in Ireland on these stocks is very scarce, though FRC investigations on some of them have begun under the EC STRIDE programme.

Where good information exists, as in the cases of largely inshore fisheries which have been studied over long periods, it is known that the stocks are in nearly all cases overfished, particularly the formerly lucrative cod, haddock and whiting, severely so.

Other contributions from FRC have included (i) information on potential areas for creation of "boxes", where fishing could be locally reduced to give enhanced protection to aggregations of juvenile fish, and (ii) suggestions on ways of making fishery protection more effective and less expensive.

R.V. "LOUGH BELTRA" - Michael Gillooly

The year 1992 was second busiest year of work for the R.V. *Lough Beltra* with 211 operational days in total. The work commenced in early January with detailed planning, with EOLAS, of hydrographic surveying in the Irish Sea for the Gas Interconnector Project. The first Lough Beltra Workshop in three years was also held at this time and was very successful. The annual refit was carried out in March.

Close liaison with, and co-ordination of, the various state, semi- state, third level education and private institutions resulted in 24 research cruises taking place in 1992, covering all areas of marine research. In addition, a number of training cruises for third level students and the new Department of the Marine Fleet Assessment Technicians were also held. The vessel was open to the public during the Dun Laoghaire Harbour Regatta and was open to scientists visiting the European Marine Biological Symposium in September. During 1992 *Lough Beltra* was involved in testing Irish designed equipment prototypes including towed instrument - carrying "fish", a sediment profile imaging camera and light attenuation measuring probes.

New equipment including side-scan sonar, fisheries acoustic equipment and many kinds of sampling gear were purchased with the assistance of EC STRIDE funds.

ACOUSTIC SURVEYING - John Milne

In order to manage marine resources effectively, including the exploitation of fish stocks, it is necessary to gain quantitative information now so that commercial and scientific projections can be made for the future. Acoustic surveying is arguably the most accurate method of determining fish numbers (biomass) for pelagic species on a geographical basis.

The expertise has been developed over the last three decades to encompass the areas of commercial sonar detectors, topographical stock estimates and satellite enhances hydrographic. At present Ireland has no input into this technology but relies on the work of contracted laboratories to carry out such surveys, the results of which are presented to ICES Working Groups at a later date. It is therefore vital from the point of view of the Irish fishing industry, against the background of the EC, that we conduct and interpret our own surveys.

Thus it was decided that a graduate would be recruited and sent for appropriate training. The job specifications are to provide expertise, purchase equipment and carry out surveys. One such survey for Celtic Sea Herring was completed, in November 1992. The next part is scheduled for January 1993. By this time the FRC will have taken delivery of Simrad scientific acoustic equipment.

FISHING GEAR TECHNOLOGY -Nick Pfeiffer

The purpose of the FRC/STRIDE programme in fishing gear technology is to develop the capacity to conduct research into factors affecting the performance of fishing trawls and low energy cost systems of fishing, within the Irish context.

The programme commenced in November 1992 with the appointment of a Fishing Gear Technologist at the FRC. The initial phase concerns identifying fisheries where fishing gear research work could prove beneficial in terms of conservation and overall efficiency of the fishing operation. This will be achieved by spending time at sea observing fishing operations. During this and the next phase, an attempt will be made to visit foreign fishery research institutes with established fishing gear technology programmes, the purpose being to observe the techniques and technology used in fishing gear and fish behaviour research, as well as to assess the likely future direction of fishing gear research within ICES countries.

The second phase (May - June '93) will see the planning of an FRC/STRIDE research project which will have been specifically designed to investigate an area of Irish fisheries identified as having potential to benefit from gear technology research. It is likely that a research project will involve mesh selectivity trials and/or investigation into the exclusion of undersize commercial species from trawl nets.

REMOTE SENSING IN THE MARINE ENVIRONMENT - David Whelan

The Satellite Remote Sensing project concerns the processing of satellite images of Irish coastal and Atlantic Ocean waters. This project, using image processing techniques on standard microcomputers, extends the use of satellite imagery in Ireland for monitoring mesoscale features, for example thermal fronts and eddies and coastal cold upwellings. Sea surface temperatures can be estimated and compared with in situ measurements from, for example, the research vessel *Lough Beltra*, as part of a Geographical Information System. The satellite measurements will be used to complement the existing research at the Fisheries Research Centre and other Irish research institutions.

Inexpensive low resolution AVHRR satellite imagery has been sourced to monitor sea surface temperatures. The existing archive of images has been examined and some of the known temperature features around the Irish coastal waters have been observed. A short study has been carried out, in support of a research paper to be published by Dr Robin Raine of the Martin Ryan Marine Science Institute, which confirms the formation of an elevated temperature sea surface skin which occurs during calm conditions, typically during the summer regime. In this study, the sea surface temperature distribution of a neap and spring tide were compared in waters off the west coast. The sea surface skin effect renders surface water temperature measurements by satellite unrepresentetive of the near surface water temperature.

GEOGRAPHICAL INFORMATION SYSTEM (GIS) - Yves Coupez

A pilot project was set up aimed at raising GIS awareness within the FRC by demonstrating GIS applications as an inventory and monitoring tool. The time scale of implementation is largely subject to the availability of data and the efforts required to standardise the data for input into the GIS. Several project categories have been identified.

Stock Assessment - Reporting and analysis of the logbook data. Mapping and graphical statistics of the catches and fishing effort by

the statistical rectangles. Management of juvenile fish surveys.

Finfish Farm - Collect, record, manage and visualise all the data (statutory reports, Gowan report & later data) relative to sea cage salmon farms as a mean, to monitor the development of salmon farms.

NORSAP - Rerun and expand the NORSAP study as an aid to prepare the new campaign of nutrient/contaminant sampling in the Irish Sea. This will include an element of sea bed mapping.

Mapping - Implement mapping tools as an aid for report preparation.

Phyto-plankton - Visualise, detect and record changes across space and time of the data held in the phyto-plankton.

ENVIRONMENT

CHEMICAL MONITORING - Mairin O' Sullivan

Chemical advice continued to be provided on the management and licensing of the disposal of wastes including industrial effluents, sewage sludge and dredge materials. This is primarily undertaken through participation in the Marine and Freshwater Vetting Committees of the Department.

The results of the sediment baseline study carried out in 1990 as part of Joint Monitoring Programme activities were assessed. Concentrations of heavy metals from outer Galway Bay are believed to be associated with localised mineralisation. There were indications of higher mercury and chromium concentrations in the muddier sediments sampled in the north-west Irish Sea.

The FRC continued to assist in monitoring the fate of Chernobyl radioactivity in Irish freshwater lakes continued.
Fish and sediments were sampled from L. Finn, L. Derg, L. Gartan in Co. Donegal, from L. Easkey in Co. Sligo, L. Callow in Co. Mayo and L. Owel in Co. Westmeath and forwarded to the Radiological Protection Institute for radio caesium measurement. The monitoring results between 1988 and 1991 have been collated and are being assessed . Lakes in the north-west of the country and L. Owel in the midlands were most affected by the fallout from the Chernobyl incident. Overall, radio caesium concentrations in brown trout have been declining since monitoring began in 1988. Highest concentrations are now being found in pike and perch which are higher up the piscivorous food chain. The sediments of all the lakes monitored were contaminated to some degree, with considerable variation in radiocaesium concentrations being found in sediments both within and between lakes.

Fish and sediments were sampled for PCB analysis from the R. Breagach, a tributary of the R. Nore at Kilkenny to follow up the fate of PCBs which were accidentally spilled there in 1980. A large - scale experimental removal of fish from the Breagach had been carried out in 1988 in an attempt to alleviate the contamination of the fish population.

MARINE CHEMISTRY -
E. Nixon, D. Mcloughlin, M. Smith, A. Rowe, B. Taaffe.

Over 1,100 samples for various analyses were collected during 1992. With the exception of a small number of samples collected towards the end of the year all samples have been analysed and reports are in preparation.

Nutrients in seawater:
More than 500 samples were collected and analysed as part of ongoing monitoring programs of the Irish Sea and Mulroy Bay and west coast productivity studies. Levels of nitrates and phosphates in Mulroy Bay were typical for northern temperate waters. This was the second year to monitor winter nutrient levels in the Irish Sea and too early to detect trends, but levels do not appear abnormally high.

Marine phytoplankton toxins:
A total of 238 shellfish samples were analysed by HPLC for DSP toxicity. Highest levels of okadaic acid and DTX 2 were detected in August. Approximately 20% of samples analysed had combined (OA+DTX2) toxicity of greater than 20μg/100g of meat. This percentage of toxic mussels suggests adequate monitoring for the protection of human health, particularly as many more samples were analysed by bioassay than by HPLC.

Ivermectin in farmed fish:
Levels of Ivermectin detected in 83 marketable fish sampled during 1992 were very low, the highest level being almost 40 times less than the maximum residue level recommended by the EC for animal meat.

Mercury monitoring:
During 1992 some 172 samples of various species from the commercial catch and shellfish from the major shellfish growing areas were collected and analysed. The mean mercury concentration in the edible portion of these samples was 0.08 mg/kg. In only 3 samples (<2%) were mercury concentrations greater than the human health standard value of 0.5 mg/kg. These 3 samples were collected from offshore areas that are unlikely to be effected by direct anthropogenic inputs of mercury.

Shellfish growing areas:
Samples from 15 shellfish growing areas were collected late in the year for testing in compliance with EC Directives for metal and chlorinated hydrocarbon analyses in fish tissue and physiochemical measurements in water.

Quality control
The importance of good quality data in marine monitoring programmes is recognised by the EC which is funding a quality assurance programme for marine monitoring called QUASIMEME. E. Nixon is a member of the QUASIMEME steering group and the Irish co-ordinator for this programme. The FRC chemistry laboratory has also been involved, as an expert laboratory, in the EC funded programmes for the preparation of marine reference materials for the analysis of PCBs in cod liver and mackerel oils, and is presently involved in the preparation of a reference material for the analysis of marine phytoplankton toxins in shellfish.

During 1992 the laboratory participated in a joint ICES/IOC/OSPARCOM intercomparison exercise on the analysis of chlorobiphenyl congeners in marine sediments. Approximately 10% of the laboratories' effort goes towards the analysis of reference materials and quality control.

International commitments:
The FRC has developed strong links with the international marine scientific community, the most important of these being through the International Council for the Exploration of the Sea (ICES). FRC scientists serve on a number of committees and working groups e.g. the advisory Committee on Marine Environment (ACME) and the Marine Chemistry Working Group (MCWG). These links have also helped the FRC to keep up to date on methodologies of marine pollution monitoring and analytical techniques specific to marine pollution.

OCEANOGRAPHY - Terry McMahon

As part of an ongoing winter nutrient monitoring programme in the western Irish Sea, temperature, salinity, nitrate, phosphate and silicate were measured at 105 near-shore stations in February. Temperature ranged from 6.2-8.6°C while salinity was in the range 31.7-34.2 PSU. The measured concentrations of nitrate, phosphate and silicate ranged from 9-20, 0.58-1.79 and 4.4-20.3 μmol/l respectively.

During April and May, two research cruises, studying the physical, chemical and biological oceanography of the continental shelf waters to the west of Ireland were carried out. The first cruise, from 17 April-28 April, was carried out jointly by scientists from PINRO, Murmansk, Russia and the Fisheries Research Centre. A total of 37 stations were visited at which depth profiles of temperature, salinity, nitrate, phosphate and oxygen were recorded and continuous measurements of near surface *in vivo* chlorophyll fluorescence were made along the cruise track. The water column was well mixed at all stations and a thermohaline front was observed along the west coast of Ireland at approximately 11° West. Increases in phytoplankton biomass were associated with this front. Nitrate concentrations were typically >6μmol/l and suggested that the spring bloom was poorly developed at this time. This contrasts markedly with the data recorded during the second cruise in the area, which was carried from 26 May-10 June. At this time the water column was stratified, nutrients in the upper mixed layer were depleted and there was little evidence of a frontal system in the area.

Few data are available on the basic oceanographic characteristics of the Waterford Harbour estuary. A brief survey was carried out in the estuary from 18-20 November during which continuous profiles of near surface temperature, salinity and turbidity were measured along the longitudinal axis of the estuary as well as at a single station over a tidal period. While temperature remained relatively constant over a tidal period (7-7.5°C) marked tidal variations were recorded in salinity (0-9 PSU) and turbidity (5-100 NTU). Longitudinally, temperature varied by some 3°C from the head of the estuary to its mouth, salinity typically varied from 0-34 PSU with the salinity gradient covering some 20km down estuary from Waterford City. Turbidity varied with tidal stage but was generally 2-4 NTU at the mouth of the estuary and increased steadily up estuary.

NORSAP IRISH SEA NUTRIENT PROGRAMME - Michael Gillooly

This project represented the first quality assured, synoptic assessment of surface nutrient distribution in the Irish Sea and was completed in early 1992, when the final report was compiled and submitted to the European Commission. Open sea nitrate concentrations measured were between 6 and 10 μmol/l. Nitrate concentrations increased close to the coast and east of the Isle of Man where concentrations varied between 10 and 50 μmol/l rising to 190 μmol/l in the Mersey Estuary. Open sea phosphate concentrations were between 0.6 and 1.0 μ mol/l. Elevated phosphate concentrations (1-2 μmol/l) were recorded east of the Isle of Man, rising to 2-5 μmol/l close to the English and N.Wales coast. Recorded elevation of both nitrate and phosphate are closely related to point source inputs.

BENTHIC ECOLOGY - Sinead Neiland

The project, financed by STRIDE, began in November and involves the monitoring and assessment of any impact on the benthos from activities such as fish farming, sewage dumping, and dredging. Monitoring and characterisation surveys are organised to assess the impact on the benthos from various dumping and dredging activities. To date two

such surveys have been carried out. A preliminary characterisation of the benthic conditions was made in the Waterford estuary, including the site where dredging for new port facilities had been implemented; in Malahide (Co. Dublin) a pre-dump survey of the proposed dump site, prior to disposal of the spoil material from the construction of a new marina was carried out.

PHYTOPLANKTON - David Jackson

Monitoring of phytoplankton samples from areas of aquaculture activity and shellfish growing areas continued in 1992. The number of samples handled increased significantly . A number of harmful algal species were recorded, notably *Dinophysis acuta* , *D. acuminata*, *D. rotunda*, *Gyrodinium* c.f. *aureolum* and *Heterosigma akashiwo*. Blooms of *G. aureolum* were recorded in Clifden Bay in late July (3.6x10 cells/l) and in Donegal Bay in August (1.1x106 cells/l) without deleterious effects but a bloom in Drumcliffe Bay in August (2.4x106) caused some mortalities to cultured clams (*Tapes semidecussatus*). *Heterosigma akashiwo* was recorded in low numbers from a number of sites including Bellacragher Bay, Clifden Bay and Bantry Bay. *Dinophysis* spp. were recorded from a large number of sites from Co. Waterford westwards to Bantry Bay and along the west coast as far north as Co. Donegal.

Marine biotoxin testing was carried out throughout the year for DSP. Over 500 DSP bioassays were carried out with toxicity being detected in the southwest, Killary Harbour and Lough Foyle. A small number of PSP assays were also carried out but no PSP toxicity was detected.

DISTRIBUTION OF TOXIC ALGAL CYSTS - Jacqueline O'Mahony & Joe Silke

This study commenced in October 1992, with the aim of mapping the distribution of toxic algal cysts around the Irish coast, with specific emphasis on aquaculture sites. An algal class within the phytoplankton , the dinoflagellates, has some members that produce compounds that are toxic to fish, invertebrates or humans. Of specific interest in this project are those species that produce a cyst as part of their life cycle strategy. Many species of the genus *Alexandrium* produce these cysts, some of which may contain paralytic shellfish toxin (PST), which can lead to paralytic shellfish poisoning (PSP). With the advent of the new EC Shellfish Directive, it is important to ensure that our shellfish are free from the presence of harmful toxins, including PST. First steps include taxonomy of the algal cysts present in sediments, followed by the assessment of the potential toxicity of these cysts, as not all species will necessarily be toxic. Study visits have been undertaken to colleagues in other EC laboratories, and valuable contacts have been made with other workers in this area of research. This may form the basis of future collaboration in this specialised field of phycology.

AQUACULTURE

FISH HEALTH UNIT - John McArdle, Frank McKiernan, Daryl Clinton.

During 1992, the unit was moved from Abbotstown to restructured laboratory facilities at Kinsealy.

VHS and IHN survey: A survey for the presence of the two salmonid viral diseases IHN and VHS was carried out during the year, to comply with a request from the EC for all member states to provide epidemiological information in relation to these diseases to enable the Commission to draw up a definitive disease listing for Directive 91/67/EEC.
Fifteen freshwater rainbow trout farms were inspected and sampled as well as two sea water trout farms and six salmon hatcheries. No evidence of either disease was detected.

Health Certification: Inspection and sampling was carried out at a number of fish farms to certify exports of live salmon eggs to Chile, Spain, Turkey and Denmark. Certification was also provided for export of salmon to France and Spain.
Pathological examination of shellfish from a number of hatcheries and farms was carried out to facilitate exports of clams, oysters and scallops to France and Italy.
Salmon eggs, live trout, Pacific oysters , clams and turbot were cleared for importation.

Vaccines: The Department of Health was advised on applications for importation of fish vaccines under the Therapeutic Substances Regulations, 1934.

DIAGNOSTIC SERVICES - Francis Scullion

The casework attended to in investigations of health and disease of farmed freshwater and marine finfish, pet fish and marine wildlife totalled 241 made up of 131 farmed fish cases, 30 pet fish and 30 wild fish. Fifty of these cases involved multiple samples so that a total of 5,273 fish were examined. Site visits numbered 34 and 191 reports were issued.

Other work in the unit included:
- the establishment of laboratory protocols for the handling of fish samples at gross post mortem stage
- creation of a database of 185 current finfish establishments
- establishment of written contact with all finfish facilities with a request for monthly reports from all finfish farms
- design of forms to allow the maintenance of appropriate records and to enable the setting up of a computer-based system.

Standard forms for reporting fish health and diseases were prepared together with instructions for sampling. These forms are supplied to fish culturists and have greatly improved the reliability of reporting and hence the speed and efficiency of diagnosis.

MICROBIOLOGY - Fiona Geoghegan and Caroline Dooley-Martyn

During the past year, approximately 5,300 fish have been received by the Fish Health Unit , all of which were examined microbiologically and virologically. A large percentage of these fish were farmed, with a smaller percentage being either pet fish of wild fish. All fish were received either for legislative or diagnostic purposes.

Microbiological sampling of these fish indicated the presence of the following organisms:

Aromonas hydrophila
Vibrio sp.
Pseudomonas sp

Aeromonas salmonicida
Yersinia ruckerii

Aeromonas salmonicida (which is quite widespread on the west coast) was detected on one new site. Significantly, *Yersinia ruckerii* was also detected on a new site - this organism has only previously been identified on two sites countrywide.
In addition to carrying out virological testing on all samples routinely received into the laboratory, an EC survey of 23 finfish farms was also carried out. This survey determined the health status of these farms with respect to the presence of the exotic viruses IHN (Infectious Haematopoetic Necrosis) and VHS (Viral Haemorrhagic Septicaemia). Following virological testing of 700 fish, using two cell lines, the absence of both viruses was confirmed. One outbreak of IPN (Infectious Pancreatic Necrosis) was confirmed. This occurred on a farm with a history of the disease.
Fourteen field visits were made and a total of 500 fish were examined on site.

SEA-LICE BIOLOGY - Dan Minchin

The biology of a trematode associated with sea-lice was studied. The species *Udonella caligorum* was found predominantly during winter and spring and does not appear to cause undue difficulty to its host. They adhere to the sea-louse and may feed on surface tissues of the salmon to which their host is attached.

Fishes associated with salmon cages are being studied. The species most frequently associated with fish cages are mackerel which can be abundant in the summer and autumn, saithe were the most common species throughout the year and were found with the salmon louse attached ,these included egg bearing stages.

Some studies on the variability of lice on farmed fish were made. Rainbow trout carried lower lice loads that salmon. Dark slim salmon could carry smaller or greater numbers of lice when compared with normal fish from the same cage, these differences may be due to their behaviour and position within cages.

SEA LICE DISTRIBUTION AND DEVELOPMENT- David Jackson

Two sea lice monitoring programmes were run in 1992. A national survey of lice infestation levels on farmed salmon at some twenty sites, first carried out in April/May 1991, was repeated in May 1992. Regular sampling was also carried out at a number of sites in the Galway/Mayo area throughout the spring and summer months. This study is being continued at a lower sampling frequency through the autumn and winter and will be complete in February 1993, when a full years sampling will have been carried out.

During July and August studies on the development, behaviour and distribution of the planktonic larval stages of *Lepeophtheirus salmonis* were carried out at two sites in Connemara, Co. Galway. The larval rearing studies were successful and viable larvae were obtained from ovigerous females on salmon hosts, ovigerous females maintained without hosts and egg strings which were detached from the females and maintained separately. Larvae were reared through to the infective copipodite stage.

SCALLOPS - Dan Minchin

There is great interest in the culture and sowing of scallops. Several areas in Ireland are undergoing trials. A test study in Connemara involves the sowing of a million scallops in Kilkiernan and Bertraghboy bays. Harvesting of sowings in Valentia Harbour

are expected in 1994. The improved knowledge and understanding of scallop husbandry will mean further involvement by private groups and by Fishermen's Co-operatives. New areas have been surveyed with the purpose of introducing new and possibly more suitable areas for scallop cultivation. Greatmans Bay was examined in September 1992 and was found to be an area with exceptionally good growth.

The production of scallop spat in Mulroy Bay was poor in 1992 and was not sufficient to satisfy the growing demand for cultivation. No significant numbers of scallop spat were produced by hatcheries in 1992.

Introductions

Japanese scallops are currently in longline culture having cleared quarantine in 1991. It is anticipated that spawning of these will take place in 1993.

SHELLFISH - C. B. Duggan

Shellfish cultivation sites at Mulroy Bay Co. Donegal and Achill, Co. Mayo were inspected.

The monitoring of tributyl tin, used as an anti-foulant in salmon cages up to 1986, has continued. Nine hundred and fifty dog whelks were collected and marked for release in five locations in Ballinakill bay, for examination in 1993 to monitor the level of contamination remaining. The adjoining shores at the proposed site for a large salmon-processing unit at Fanad, Co. Donegal were studied to assess any possible environmental effect. The results indicated that no material environmental damage would result.

COMPUTER FACILITIES

EQUIPMENT AND SOFTWARE UPGRADE - Kerry Blake and Richard Quinn

Using resources provided by the STRIDE programme a new Local Area Network (LAN) was developed and implemented. The system consists of two 486/33 servers serving a mixture of 386 and 486 desktop and portable personal computers. The two servers provide in total over two Giga bytes of storage space for FRC data and applications. The platform used for the network is NOVELL Netware 3.11 and both SCO UNIX and DOS are available to users. An integrated commercial software package providing word-processing, spreadsheet and presentation facilities running under Microsoft Windows 3.1 is the main user interface.

The acquisition of a relation database management system is currently being investigated and a recommendation to purchase and install an RDBMS is in preparation. Presently all the data gathered by the FRC are held in a variety of disparate electronic and paper formats resulting in duplicated and inconsistent data sets. When the RDBMS is installed these data will be gradually ported to the database and application programs will be written to control data input and provide reports, summaries, etc. All database programs will have MS Windows front ends. The GIS currently being developed will also interface with this database providing a consistent and up-to-date picture of the database information.

PUBLICATIONS

Connolly, P. The Irish Sea Young Fish Survey Programme 1986 to 1991 *Proceedings of 6th Lough Beltra Workshop* 1992.

Fahy, E. & Fannon, E. The exploitation of megrim *Lepidorhombus whiffiagonis* by the Irish demersal fleet. *Irish Fisheries Investigations* B(38): 18 pp.

--- The western spurdog *Squalus acanthias* L. fishery in 1989 and 1990, with observations on further development of the gillnet fishery directed on the species *Fisheries Bulletin* 11:11pp.

Fahy, E & Gleeson, P. The exploitation of angler fish *Lophius* in Irish waters. *Irish Fisheries Investigations* B (40): 18 pp.

Fahy, E., O'Donoghue, S., & O'Driscoll M. Estimating effort by the Irish gillnet fishery. *Fishery Leaflet* 152.

Gillooly, M., E. Nixon, T. McMahon, G. O'Sullivan and V. Choiseul. Winter Nitrate and Phosphate levels in the Western Irish Sea in 1991. *Fishery Leaflet* 150.

Gillooly,M .., O'Sullivan, G., Kirkwood, D., Aminot, A., & the participants in NORSAP Contract B6618 - 89- 03 (1992). The Establishment of a database for trend monitoring of nutrients in the Irish Sea. Project Report, January 1992.

Hu,T., Doyle,J., Jackson, D., Marr,J., Nixon,E., Pleasance,S., Quilliam,M., Walter,J. and Wright,J. Isolation of a New Diarrhetic Shellfish Poison from Irish Mussels. *J. Chem. Soc.,Chemical Communications* 1:39-41.

Jackson, D. and Costello,M.J. Dichlorvos and alternative sealice treatments. In De Pauw & Joyce eds. *European Aquaculture Association Special Publ.* 16 536pp.

Jackson,D., Nixon,E., Silke,J., and Taaffe,B. (in press). DSP Toxicity in Southwest Ireland. *The Phycologist* 34.- (in press) DSP in Ireland an overview 1990- Present. *The Phycologist* 34:-

Jackson, D. & Minchin, D. (In press). Sea-lice infestation of farmed salmon in Ireland. In: Boxshall, G.A. & Defaye, D. (eds.) *Pathogens of wild and farmed fish: sea lice.* Ellis Horwood Ltd., London.

--- (In prep). Reproductive output of two caligid copepod species parasitic on cultivated salmon *Invertebrate Reproduction and Development.*

McArdle (In Press) Furunculosis as a possible factor in the decline of sea trout stocks in Ireland.

--- Studies of a European Shellfish Disease: *Bonamia ostreae* parasite of the Flat Oyster. Final Report of EC FAR Study.

McArdle, J. , Dooley-Martin, C., Geoghegan, F., & Roger, H. (In press). Furunculosis as a factor in the decline of the Sea Trout population on the west coast of Ireland.

McMahon, T.G, Raine, R.C.T, Fast, T, Kies, L. and Patching, J.W. Phytoplankton biomass, light attenuation and mixing in the Shannon Estuary, Ireland. *Journal of the Marine Biological Association of the U.K.* 72: 709-720.

McMahon, T., Jackson, D. and Nixon, E. (in press). Observations of a bloom of *Gyrodinium aureolum* off the SW. coast during summer 1991. *Proceedings of the 6th R.V. Lough Beltra Workshop.*

Minchin, D. Induced spawning of the scallop, *Pecten maximus*, in the sea. *Aquaculture* 101: 187-190.

--- Biological observations on young scallops, *Pecten maximus. J. mar. biol. Ass. U.K.*, 72: 807-819.

Minchin, D. 1993. Multiple species, mass spawning events in an Irish sea lough: the effect of temperatures on spawning and recruitment of invertebrates. *Invertebrate Reproduction and Development.* 22:

--- Possible influences of increases in mean sea temperature on Irish marine fauna and fisheries. In: Biogeography of Ireland: Past, Present and Future. Eds. M.J. Costello & C. Kelly. *Occ. Publ. Ir,. biogeog. Soc.* No. 2. 1993.

Minchin, D. & Jackson, D,. 1993. Udonella caligorum Johnston, 1835 (Platyhelminthes: Udonellidea) associated with caligid copepods on farmed salmon. In : Boxhall, G.A. & Defaye, D.(eds.), *Pathogens of wild and farmed fish.:sealice. Ellis Horwood Ltd., London.*

Nixon, E., Doyle, J., Tingmo, Hu., Marr.J ., Pleasance,S. Walter, J. Quilliam.M, & Wright J. Isolation of a New Diarrhetic Shellfish Poison from Irish Mussels *J. Chem. Soc., Chem. Commun* 1. 39-41.

O'Mahony, J. , Silke, J., Jackson,D. & Doyle J. (In Press) Gyrodinium cf. aureolum in Irish Waters Implications for Aquaculture. *The Phycologist 34.*

O'Mahony, J. Phytoplankton of the Dunkeelin Estuary, Western Ireland. *The Phycologist 34.*

O' Sullivan, M.P., Nixon, E.R., McLaughlin, O'Sullivan, ML. and O' Sullivan, D. Chemical contaminants in Irish estuarine and coastal waters, 1978 to1988. *Fisheries Bulletin* (10).34 pp.

Titov, O. V., Akimov, P.P. and McMahon, T.G.. Physical and chemical observations of waters west of the British Isles in spring 1992. ICES CM 1992/C:24

Tully, O. and Hillis, J. P. (In prep.) Causes and spatial scales of variability in population structure of *Nephrops norvegicus* (L.) in the Irish Sea .

CONFERENCE DOCUMENTS

Browne, J. Report on the workshop on salmon assessment methodology. *ICES CM 1992.*

--- Report of Working Group on North Atlantic Salmon *ICES CM 1992*

--- Report on ACFM Meeting May 1992. *ICES CM 1992*

--- Report on ACFM Meeting November 1992. *ICES CM 1992*

Connolly, P. The discarding of whiting in the Irish Sea by the Irish Nephrops Fleet. ICES NoSh Working Group Aberdeen, September.

--- The Structure and activity of the Irish Whitefish fleet. ICES NoSh Working Group Aberdeen, September.

--- Results of 1992 stock monitoring Programme (catch-at-age, landings and recruitment data for cod, whiting, haddock, plaice, and sole in ICES areas VIIa, VIIg, VIa and VIb). ICES NoSh Working Group Aberdeen, September.

--- Report of the UK-Irish Consultations on Fisheries Management in the Irish Sea, Dublin 25 to 26 March.

Fahy, E. An inventory of enmeshing gears in European waters. EC Scientific and Technical Committee for Fisheries.

Fahy, E. & Gleeson ,P. A second assessment of the stock of megrim *Lepidorhombus whiffiagonis* in divisions V11b,c,j, and k, with particular reference to the landings of joint venture vessels. *ICES CM 1992* G:8

Fahy, E. & Gleeson,P. Aspects of the exploitation of the northern hake *Merluccius merluccius* stock by fleets based in the Irish Republic. *ICES CM 1992* G: 77

Gillooly M. (editor) Lough Beltra 1988 - *Proceedings of 5th Annual Lough Beltra Workshop.*

Gillooly, M. & O'Sullivan, G. eds. (in prep.) Lough Beltra - Past, Present and Future - *Proceedings of 6th Lough Beltra Workshop.*

Hillis, J.P. The Irish Sea Bioeconomic Study in Management Strategies and Objectives for Fisheries (Ed. J. Horwood and D. de G. Griffith) being the report of a meeting held on the scientific aspects of bioeconomic objectives and strategies for EC fisheries management, Dublin 21-24 January.

Hillis, J.P. & Whelan,B.J. (in press). Fishermen's Time Discounting Rates and other factors to be considered in Planning the Rehabilitation of Depleted Fisheries. Proceedings of the 6th Biennial Conference of the International Institute of Fisheries Economics and Trade, Paris 6-9 July.

--- (in press). The Optimisation of Profitability in Irish Sea Fisheries: Some Preliminary Results. Proceedings of the 4th Annual Conference of the European Association of Fisheries Economists, Salerno, 22 - 24 April.

Jackson, D. & Minchin, D. 1992. Reproductive output of two caligid copepod species parasitic on cultivated salmon. 6th International Congress on Invertebrate Reproduction, Trinity College, Dublin, July 1992.

--- Sea lice infestation of farmed salmon in Ireland. First European Crustacean Conference, Paris 31 Aug - 5 Sept.

Minchin, D. Spawning and recruitment of some invertebrates in Ireland. Sixth International Congress on Invertebrate Reproduction, 28 June - 3 July 1992, Trinity College, Dublin.

--- Gigantism in the scallop, *Pecten maximus(*L.). 27th European Marine Biology Symposium, Trinity College, Dublin, 7-11 September 1992.

Molloy, J. Herring larval surveys in the Celtic Sea *Lough Beltra* workshop. Dublin 30-31 January.

Moriarty, C. Inland Fisheries. Water of life Symposium, Royal Dublin Society,

Nixon, E. Marine Monitoring using the RV Lough Beltra 1991. Lough Beltra Workshop, Dublin 30-31 January.

O' Maoileidigh, N, .Report on the 1991 micro tagging programme. Committee of the Joint Protection of the Erne, Annual Meeting , 8 - 9 June, Dublin.

--- The physiology of salmonid smoltification and implications in the collapse of the collapse of the sea trout populations in the west of Ireland - Joint report by the Fisheries Research Centre and the Zoology Dept., University College Dublin and Salmara Teo., for the Sea Trout Working Group, December

O'Maoileidigh, N. (ed) Sea Trout Working Group Report (1992). Minister for the Marine's Sea Trout Working Group 7 - 10 December.
--- Report of the study group on the Norwegian Sea and Faroes salmon fishery. *ICES CM 1992* M:4.
--- Report of the Workshop on Salmon Assessment Methodology. *ICES CM 1992* M:8.
--- Report of the Working Group on North Atlantic Salmon. *ICES CM 1992*M:
O' Maoileidigh, N., Bond, N. and O' Farrell, M. River Erne salmon radio tracking 1991 - 1992. Committee of the Joint Protection of the Erne, Annual Meeting 8 - 9 June.
O'Sullivan, M.P. Sectoral overview on the monitoring of the marine environment undertaken by the Department of the Marine. Symposium on Marine Environmental Monitoring EOLAS, Dublin, March.

INTERNATIONAL CONFERENCES

Browne, J. - ICES Statutory Meeting (Delegate), Rostock, Germany, 22 September-3 October.
Connolly, P. UK-Irish Consultations on Fisheries Management in the Irish Sea, Dublin 25 to 26 March. (Rapporteur).
--- Lough Beltra Workshop, Dublin 29 to 30 January (Speaker).
--- UK-Irish Consultations on Fisheries Management in the Irish Sea, Dublin, 25 to 26 March.
--- ICES Working Group on the Assessment of Northern Shelf Demersal Stocks, Aberdeen, 1 to 11 September. (Member).
--- EC Workshop on Data Collection in the Atlantic for Fish Stock Assessment Lisbon, 15 to 17 December.
Duggan, C. B. Turbot Working Group, University College Cork, 13 April.
--- Irish Coast Environment Group Symposium on Dublin Bay. Dublin Bay Water Quality Management Plant, 24 January.
Doyle, J. Oslo Paris Commissions , Stockholm, 12-14 January.
--- ICES Working Group on the Environmental Impacts of Aquaculture, 21-25th April, Kiel, Germany.
--- EC Meeting on Shellfish Directive, Brussels, 11 May.
--- UK Meeting of Co., Edinburgh, 12 May , Edinburgh, 13 May.
--- Meeting of the Irish Sea Science Co-ordination Group, London, 30 July.
--- Oslo Commission, (Delegate), Paris, 13-14 September.
--- ICES Statutory Meeting (Delegate), Rostock, Germany, 22 September-3 October.
--- Workshops on Fish Farm effluents and their control in EC countries Hamburg, Germany, 21-25 November.
Fahy, E.. Meetings of STCF (Scientific and Technical Committee for Fisheries) of EC. March & October
Geoghegan,F., US./ Irish Workshop on Fish/ Shellfish .
--- Diseases and Biotechnology (Delegate). 14-17 September, University College, Cork.
Gillooly, M. Lough Beltra Workshop, Dublin 30-31 January. (Organiser & Speaker).
--- Oceanology 1992 conference and Exhibition, Brighton, England 10-13 March. (Delegate).
Griffith, D de G., EC meetings
--- Advisory Committee on MAST Programme, Brussels 17 January, 9-10 April, 15 June.
--- Negotiations on Multiannual Guidance Programme on Fisheries, Brussels, 29 January.
--- STRIDE Programme workshop, Bari, Italy, 26-27 October.
--- Structures Committee, DG XIV, Brussels, 25 November.
--- Council of Fisheries Ministers, Brussels, 20-21 December.
ICES Meetings (as President)
--- Symposium on management of primary production from the molecular to the global scale, La Rochelle, France, 20-22 April.
--- ICES Programme planning group.
--- ICES Bureau (Executive Committee) meeting, Copenhagen, 3-4 June.
--- Symposium on fish behaviour in relation to fishery operations, Bergen, Norway, 11-13 June.
--- Statutory Meeting, Rostock, Germany, 23 September - 2 October
European Science Foundation
--- Symposium on European ocean science, Obernai, France, 7-9 October

Hillis, J.P. EC meeting on the scientific aspects of bioeconomic objectives and strategies for fisheries management, Dublin, 21 - 24 January (speaker).

--- ICES Working Groups on *Nephrops and Pandalus* Stocks, Aberdeen , 25 February - 5 March.

--- Commission of the European Communities: Scientific and Technical Committee of Fisheries, meeting , Brussels, 9-13 March, (Fishery Economics Expert).

--- U.K Irish Consultations on Fisheries Management in the Irish Sea, Dublin 25-26 March.

--- Annual General Meeting and Conference of the European Association of Fisheries Economists (EAFE), Salerno, 22-24 April. Rapporteur and Chairman of Session on Effort Management. (Rapporteur and Session Chairman).

--- Biennial Conference of International Institute of Fisheries Economics and Trade, Paris, 6-7 July.

--- U.K. Irish Meeting to discuss design and construction of square mesh panels in Nephrops trawls. Dublin, 13 October.

Hillis J.P. & Lynch J. EAFE Workshop on Bioeconomic Modelling, Edinburgh, 6 October.

Jackson,D. 6th International Congress on Invertebrate Reproduction. Trinity College, Dublin, 28 June - 3 July (Speaker).

--- 1st European Crustacean Conference. Paris. 31 August - 5 September (Speaker).

Jackson., D. Joint IOC/FAO Intergovernmental Panel on Harmful Algal Blooms, UNESCO, Paris. 23 - 25 June (Delegate).

--- British Phycological Society Winter Meeting, Swansea. 4 - 7 January 1993 (Speaker).

McArdle, John, Contributions were made at ten meetings of EC Working Parties and Expert Groups which advised the Commission on the following topics: methodology for diagnosis of List 1 fish diseases and List 3 shellfish diseases;

--- amendments to List 2 and 3 diseases of fish and shellfish

--- transfers and movement of non-susceptible fish and shellfish species.

--- additions and amendments to EC Directives 91/67/EEC and COM 92. 204.

--- ICES Working Group on Pathology and Diseases of Marine Organisms. Copenhagen. March (Delegate)

--- International Conference on Pathological Condition of Wild Salmonids. Aberdeen, May. (Delegate).

Mc Mahon T. IOC-FAO Intergovernmental Panel on Harmful Algal Blooms. First Session, Paris, 23-25 June. (National Representative).

--- ICES 80th Statutory Meeting. Rostock-Warenemude, Germany. 24-29 September.

Minchin, D. ICES Working Group, Introductions and Transfers of Marine Organisms. 13-17 April , Lisbon, (Delegate).

--- 6th International Congress on Invertebrate Reproduction. Trinity College, Dublin, 28 June- 3 July 1992 (Speaker).

--- 27th European Marine Biology Conference, Trinity College, Dublin, 7-11 September :(Speaker).

--- BIOMAR Conference, Hodson Bay Hotel, Athlone, 11-13 November (Delegate).

--- Irish-American Aquaculture Group (Ir-Am Aqua) Martin Ryan Institute, Galway, 17-19 November (Delegate).

Molloy, J. The ICES herring assessment working group and ICES Mackerel and Horse Mackerel Working Group (Delegate).

--- EEC Scientific and Technical Committee for Fisheries (STCF) (Delegate).

Moriarty, C. European Inland Fisheries Advisory Commission 17th Session, Lugano, Switzerland 22-26 May. Rapporteur, Sub-commission 1.

O'Mahony, J. British Phycological Society Winter meeting, University of Wales, Swansee 4 - 8 January 93.

O' Sullivan M.P. Seventeenth meeting of OSPARCOM Joint Monitoring Group, Uppsala, Sweden. 20-24 January, 1992. (Delegate.)

--- Nineteenth meeting of OSPARCOM Standing Advisory Committee for Scientific Advice, Dublin. 23-25 March, 1992. (Delegate)

--- Symposium on Marine Environmental Monitoring, EOLAS, Glasnevin, 31 March 1992. (Speaker).

Scullion, F. International Conference on the Implications of Infectious Diseases on Captive Propagation and Reintroduction Programmes of Threatened Species 11 - 13 Non, Oakland California. (Delegate).

--- Joint Conference of the American Association of Zoo Veterinarians and the Association of Wildlife Veterinarians 14-19 November 1992, Oakland California. (Delegate)..

Nixon, E., & McLaughlin, D. Quality Assurance Procedures for marine data. EOLAS, Dublin .

--- Safety in the Laboratory. Institute of Chemistry of Ireland, Dublin .

Nixon,E. ICES Marine Chemistry Working Group. Tenerife, March .

--- Quasimeme Steering Group. EC funded. 20 & 21 January, 4 & 5th May, 16 & 17 December.

STUDY TOURS and COURSES

Connolly, P. Geostatistics Course in Fisheries Science, Paris, 3 - 7 February .

--- NOAA, Woods Hole Fisheries Laboratory, USA. 8-10 July.

Doherty, M. and Mc Cormac,H. Training trip to DANI, Belfast to study fish ageing techniques and procedures, 26 - 30 October..

Geoghegan, F. Fish Diseases Course , Institute of Aquaculture , University of Stirling, Scotland, 13-17 January.

Hillis, J.P. Fisheries Laboratory, Ministry of Agriculture, Fisheries and Food Lowestoft, Methods of calculating rate of recovery of fish catches in response to reduction of overfishing. 3-5 February.

--- Edinburgh, Sea Fish Industry Authority. Holistic modelling of Irish Sea Fisheries. 24th February and 6th March.

--- Fisheries Laboratory, Ministry of Agriculture, Fisheries and Food, Lowestoft, UK. Further studies on catch improvement after improvements in fishery management. 2-3 July.

McArdle Visit to MAC Fish Disease Laboratory. Weymouth , December.

Mc Cormick, H. Training trip to Marine Laboratory Aberdeen to study fish ageing techniques and procedures. 30 March - 3 April.

McDermott, T. Invited by Norwegian Institute for Nature Research to establish a micro tagging programme in Norway, June.

Mc Mahon, T. The European Institute for Advanced Studies in Oceanography course on Physics, Chemistry and Biology of Oceanographic Fronts. Bangor, Wales. 26 July-12 August.

Moriarty, C. Mandego River, Portugal : study of glass eel fishery, 9-13 December.

Nixon, E HPLC Training Course, Masons Technology, Dublin.

--- Metal Analysis in biota and sediments, IFREMER, France.

O'Mahony, J. SOAFD Laboratory, Aberdeen, Scotland. Cruise off NE coast - Dinoflagellate Cyst Sampling Techniques, 30 October - 6 Nov.

--- University of Westminster, London. U.K. Processing of Sediment samples for Dinoflagellate Cysts. 11 - 13 Nov.

Ronan, M. Accompanied research cruise off West coasts of Scotland and Ireland, on board VERVE "Scotia" (SOAFD, Marine Laboratory, Aberdeen): collection of young Argentines, !7 November - 6 Dec. SOAFD, Marine Laboratory, Aberdeen, Scotland: collection of data, 7 - 16 Dec.

Rowe, A. & McLaughlin,D. Metal analysis in biota and sediments, IFREMER, France.

Silke; J. Polytechnic Central London; October 1992 Techniques for the taking and analysing of samples for dinoflagellate cysts.

Smyth,M. HPLC Training course, Masons Technology, Dublin.

REPORTS

Minchin, D. 1992 Evaluation of the potential for scallops in Greatmans Bay, Co. Galway. Commissioned by Dr Michael O' Toole for Taidhe MaraTeoranta, Udaras na Gaelteacta. 5 October 1992, 16 pages.

O'Maoileidigh, N. Microtag recovery programme in West Greenland to assess the exploitation by this fishery on Irish 2 Sea Winter salmon, August-September.

O Maoileidigh, N., Doolan, B., Cullen, A. , McDermott, T and Bond, N. Coded Wire Tag Returns 1992 - Compilation of coded wire tag returns for tag release groups in 1990.